

SLL 79-076/M

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## WINDOW MATERIALS PROPERTIES

CaF<sub>2</sub>      SrF<sub>2</sub>  
KCl      NaCl  
ZnSe

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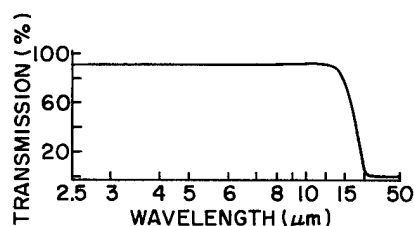
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# PROPERTIES OF HOT-FORGED SODIUM CHLORIDE (NaCl)<sup>ac</sup>

## OPTICAL PROPERTIES:

Wavelength (μm)	2.8	3.8	5.3	9.28	10.6
Absorption (cm <sup>-1</sup> × 10 <sup>-4</sup> )..	10.0	4.80	1.59	12.6	11.8
dn/dT (× 10 <sup>-5</sup> ).....	-3.28	-3.28	-3.17	-2.41	-2.20
Refractive Index.....	1.53	1.53	1.52	1.49	1.49

## TRANSMISSION:



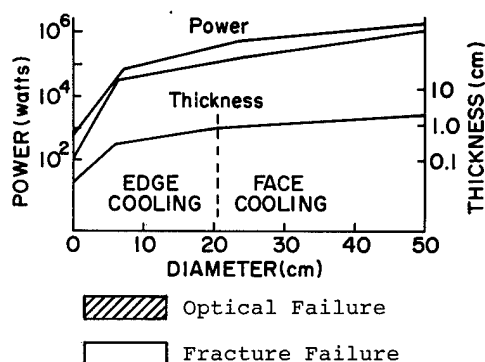
## MECHANICAL PROPERTIES:

Poisson Ratio.....	0.25
Yield Strength (psi)....	4000
Youngs Modulus (psi)....	5.80 × 10 <sup>6</sup>

## THERMAL AND PHYSICAL PROPERTIES:

Density (g/cc).....	2.16
Expansion Coefficient (°K <sup>-1</sup> )....	44.0 × 10 <sup>-6</sup>
Grain Size (microns).....	8.9
Hardness (knoop).....	18.0
Heat Capacity (j/g °K).....	0.857
Resistivity (ohm-cm).....	insulator
Solubility (g/100g H <sub>2</sub> O @ 25°C).....	35.7
Thermal Conductivity (w/cm °K)...	0.00371

## FIGURE-OF-MERIT ESTIMATES OF POWER AND THICKNESS<sup>b</sup>:



<sup>a</sup> Compilation of this data supported by the Air Force Materials Laboratory

<sup>b</sup> M. Sparks and H.C. Chow, Third Conference on High Power Infrared Laser Window Materials, Vol. III, 1083 (1974)

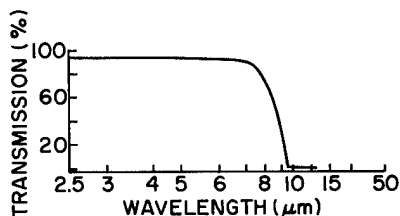
<sup>c</sup> Additional data may be obtained from the University of Dayton Research Institute, Optical Materials Research, KL542 (J. Detrio) 300 College Park Ave., Dayton, Ohio 45469.

# PROPERTIES OF FUSION CAST CALCIUM FLOURIDE (CaF<sub>2</sub>)<sup>ac</sup>

## OPTICAL PROPERTIES:

Wavelength (μm)	2.8	3.8	5.3	9.28	10.6
Absorption (cm <sup>-1</sup> ÷10 <sup>-4</sup> )..	8.70	7.24	5.79	---	----
dn/dT (÷10 <sup>-5</sup> ).....	-1.28	-1.22	-0.72	-0.56	-0.56
Refractive Index.....	1.42	1.42	1.39	1.32	1.31

## TRANSMISSION:



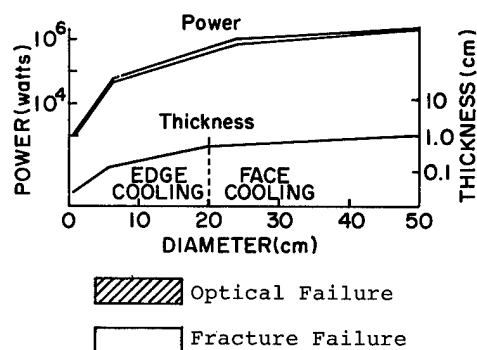
## MECHANICAL PROPERTIES:

Poisson Ratio.....	0.28
Fracture Strength (psi)....	11800
Youngs Modulus (psi).....	15.7x10 <sup>6</sup>

## THERMAL AND PHYSICAL PROPERTIES:

Density (g/cc).....	3.18
Expansion Coefficient (°K <sup>-1</sup> )....	21.2x10 <sup>-6</sup>
Grain Size (cm).....	2-5
Hardness (knoop).....	172
Heat Capacity (j/g°K).....	0.812
Resistivity (ohm-cm).....	insulator
Solubility (g/100gH <sub>2</sub> O@25°C).....	0.0017
Thermal Conductivity (w/cm°K)...	0.080

## FIGURE-OF-MERIT ESTIMATES OF POWER AND THICKNESS<sup>b</sup>:



<sup>a</sup> Compilation of this data supported by the Air Force Materials Laboratory

<sup>b</sup> M. Sparks and H.C. Chow, Third Conference on High Power Infrared Laser Window Materials, Vol.III, 1083(1974).

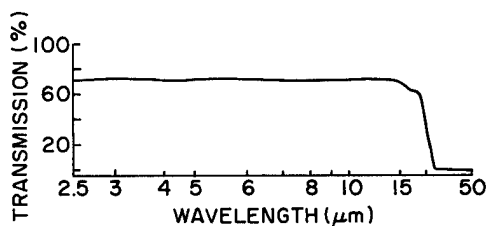
<sup>c</sup> Additional data may be obtained from the University of Dayton Research Institute, Optical Materials Research, KL542 (J. Detrio) 300 College Park Ave., Dayton, Ohio 45469.

# PROPERTIES OF CVD ZINC SELENIDE (ZnSe)<sup>a,c</sup>

## OPTICAL PROPERTIES:

Wavelength (μm)	2.8	3.8	5.3	9.28	10.6
Absorption (cm <sup>-1</sup> × 10 <sup>-4</sup> )..	25.06	15.67	5.38	34.40	21.40
dn/dT (× 10 <sup>-5</sup> ).....	5.34	5.34	----	6.08	6.17
Refractive Index.....	2.43	2.43	2.43	2.41	2.41

## TRANSMISSION:



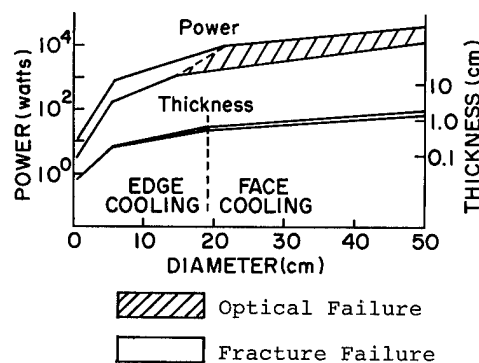
## MECHANICAL PROPERTIES:

Poisson Ratio.....0.28  
Yield Strength (psi).....7500  
Youngs Modulus (psi).....9.75x10<sup>6</sup>

## THERMAL AND PHYSICAL PROPERTIES:

Density (g/cc).....5.27  
Expansion Coefficient (°K<sup>-1</sup>)....7.80x10<sup>-6</sup>  
Grain Size (microns).....72.0  
Hardness (knoop).....100  
Heat Capacity (j/g°K).....0.355  
Resistivity (ohm-cm).....1.00x10<sup>12</sup>  
Solubility (g/100gH<sub>2</sub>O@25°C).....insoluble  
Thermal Conductivity (w/cm°K)...0.170

FIGURE-OF-MERIT ESTIMATES OF POWER AND THICKNESS<sup>b</sup>:



<sup>a</sup> Compilation of this data supported by the Air Force Materials Laboratory

<sup>b</sup> M. Sparks and H.C. Chow, Third Conference on High Power Infrared Laser Window Materials, Vol.III, 1083(1974).

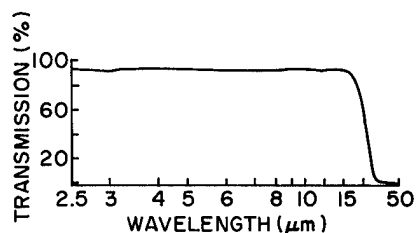
<sup>c</sup> Additional data may be obtained from the University of Dayton Research Institute, Optical Materials Research, KL542 (J. Detrio) 300 College Park Ave., Dayton, Ohio 45469.

**PROPERTIES OF HOT-FORGED POTASSIUM CHLORIDE  
WITH RUBIDIUM CHLORIDE (KCl-0.0175 RbCl)<sup>abd</sup>**

**OPTICAL PROPERTIES:**

Wavelength (μm)	2.8	3.8	5.3	9.28	10.6
Absorption (cm <sup>-1</sup> ÷10 <sup>-4</sup> )..	11.60	1.50	1.00	13.00	9.21
dn/dT (÷10 <sup>-5</sup> ).....	-3.40	-3.40	-3.15	-3.13	-3.13
Refractive Index.....	1.46	1.46	1.47	1.45	1.45

**TRANSMISSION:**



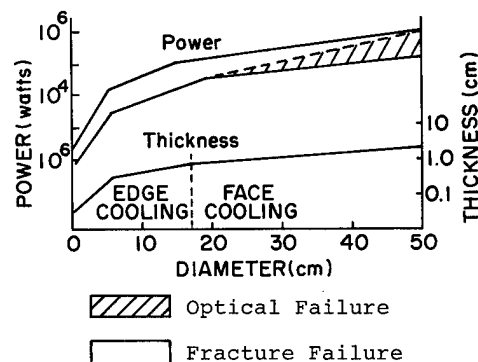
**MECHANICAL PROPERTIES:**

Poisson Ratio.....0.20  
Yield Strength(psi)....3000  
Youngs Modulus(psi)....3.20x10<sup>6</sup>

**THERMAL AND PHYSICAL PROPERTIES:**

Density (g/cc).....1.987  
Expansion Coefficient (°K<sup>-1</sup>)....40.0x10<sup>-6</sup>  
Grain Size (microns).....7.0  
Hardness (knoop).....11.0  
Heat Capacity (j/g°K).....0.647  
Resistivity (ohm-cm).....insulator  
Solubility (g/100gH<sub>2</sub>O@25°C).....3.47  
Thermal Conductivity (w/cm°K)....0.033

**FIGURE-OF-MERIT ESTIMATES OF POWER  
AND THICKNESS<sup>c</sup>:**



<sup>a</sup> Compilation of this data supported by the Air Force Materials Laboratory.

<sup>b</sup> Basic composition can be doped with nominally 10ppm Eu<sup>++</sup> for increased microstructure stability.

<sup>c</sup> M. Sparks and H.C. Chow, Third Conference on High Power Infrared Laser Window Materials, Vol.III, 1083(1974).

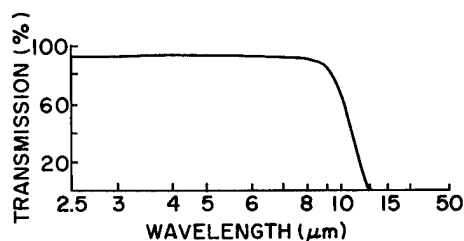
<sup>d</sup> Additional data may be obtained from the University of Dayton Research Institute, Optical Materials research, KL542 (J.A. Detrio) 300 College Park Ave., Dayton, Ohio 45469

# **PROPERTIES OF FUSION CAST STONTIUM FLUORIDE (SrF<sub>2</sub>)<sup>ao</sup>**

## **OPTICAL PROPERTIES:**

Wavelength (μm)	2.8	3.8	5.3	9.28	10.6
Absorption (cm <sup>-1</sup> ÷10 <sup>-4</sup> )..	5.77	3.25	2.34	----	----
dn/dT(÷10 <sup>-5</sup> ).....	-1.19	-1.19	-1.19	-1.19	-1.19
Refractive Index.....	1.42	1.42	1.40	1.37	1.36

## **TRANSMISSION:**



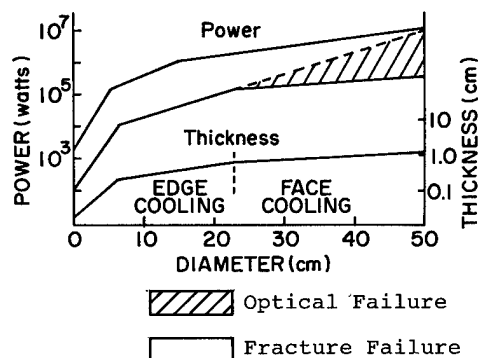
## **MECHANICAL PROPERTIES:**

Poisson Ratio.....	0.26
Fracture Strength (psi)...	10600
Youngs Modulus (psi).....	12.1x10 <sup>6</sup>

## **THERMAL AND PHYSICAL PROPERTIES:**

Density (g/cc).....	4.278
Expansion Coefficient (°K <sup>-1</sup> )....	21.3x10 <sup>-6</sup>
Grain Size (cm).....	2-5
Hardness (knoop).....	154
Heat Capacity (j/g°K).....	0.556
Resistivity (ohm-cm).....	insulator
Solubility (g/100gH <sub>2</sub> O@25°C).....	0.0119
Thermal Conductivity (w/cm°K)...	0.074

## **FIGURE-OF-MERIT ESTIMATES OF POWER AND THICKNESS<sup>b</sup>:**



<sup>a</sup> Compilation of this data supported by the Air Force Materials Laboratory

<sup>b</sup> M. Sparks and H.C. Chow, Third Conference on High Power Infrared Laser Window Materials, Vol.III, 1083(1974).

<sup>c</sup> Additonal data may be obtained from the University of Dayton Research Institute, Optical Materials Research, KL542 (J. Detrio) 300 College Park Ave., Dayton, Ohio 45469.